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Geomys arenarius. By Stephen L. Williams and Robert J. Baker

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Geomys arenarius Merriam, 1895

Desert Pocket Gopher

Geomys arenarius Merriam, 1895:139. Type locality El Paso, El Paso Co., Texas.

CONTEXT AND CONTENT. Order Rodentia, Family Geomyidae, Subfamily Geomyinae. The genus *Geomys* contains eight species (see key in Mammalian Species No. 35). Two subspecies of *Geomys arenarius* are recognized as follows: *G. a. arenarius* Merriam, 1895:139, see above. *G. a. brevirostris* Hall, 1932:95. Type locality E edge of [white] sand [9 mi. W Tularosa], Tularosa-Hot Springs Road, Otero Co., New Mexico.

DIAGNOSIS. *Geomys arenarius* most closely resembles *G. personatus* and *G. tropicalis* morphologically (Alvarez, 1963). These three species differ from other *Geomys* in having a ro-

trum that is wider than the length of the basioccipital. Externally, *G. arenarius* is a medium-sized gopher with a relatively long tail and pale coloration. The pelage is drab-brown dorsally, with finely scattered black-tipped hairs. This color pattern continues laterally and onto the venter where it may or may not blend with the white hair on the abdomen, chest, and feet. Most of the tail is covered with hair (Merriam, 1895).

The configuration of the zygomatic arch is the most easily recognized cranial feature that sets *G. arenarius* apart from other species. The occurrence of a prominent knob on the end of the squamosal arm of the zygoma is characteristic of *G. arenarius* and *G. tropicalis*. The zygoma of *G. arenarius* differs from that of both *G. tropicalis* and *G. personatus* in having parallel sides in contrast to sides that converge posteriorly. *Geomys arenarius* also differs from these two species in having a subquadangular interparietal and no sagittal crest (Alvarez, 1963). Additional salient cranial features, noted by Merriam (1895), are: posteriorly bulging occiput; jugal shorter than basioccipital; palatopterygoids normally abruptly narrowed and with parallel sides; prominent, separated, and nearly parallel temporal ridges; heavy mandible (figure 1).

GENERAL CHARACTERS. Like other members of the genus, *G. arenarius* is a medium-sized fossorial rodent. The characteristic features are thick-set body, reduced eyes and pinnae, massive strong-clawed forelegs, nearly naked tail of medium length (figure 2), and external, fur-lined cheek pouches (figure 3). The dentition is characterized by bisulcate incisors, enamel on the anterior surface of the incisors, and a dental formula of i 1/1, c 0/0, p 1/1, m 3/3, total 20.

Means and extremes (in parentheses) for external and cranial measurements, in millimeters, of three adult male and 10 adult female (respectively) topotypes of *Geomys arenarius arenarius*, listed by Hall (1932), are as follows: total length, 262 (250 to 280), 243 (225 to 250); tail length, 85 (74 to 95), 74 (63 to 84); hind foot length, 33 (32 to 34), 31.5 (29 to 35); basilar length, 37.3 (35.9 to 38.4), 35.3 (32.3 to 37.8); rostrum length, 19.6 (19.2 to 20.4), 18.1 (16.4 to 19.3); rostrum breadth, 10.2 (9.7 to 10.6), 9.7 (9.3 to 10.0); nasal length, 16.5 (16.1 to 17.2), 15.4 (13.9 to 17.0); zygomatic breadth, 26.5 (25.1 to 27.3), 24.9 (24.0 to 26.4); mastoid breadth, 24.8 (23.1 to 25.9), 23.3 (22.5 to 24.6); interorbital breadth, 6.5 (6.4 to 6.7), 6.5 (6.1 to 6.8); upper molar alveolar length, 8.4 (8.1 to 8.8), 7.9 (7.1 to 8.2). Average Ives tint photometer reading for red of *G. a. arenarius* is 21 per cent (Blair, 1943).

Measurements of seven adult male and 10 adult female *G. a. brevirostris*, listed by Hall (1932), are as follows: total

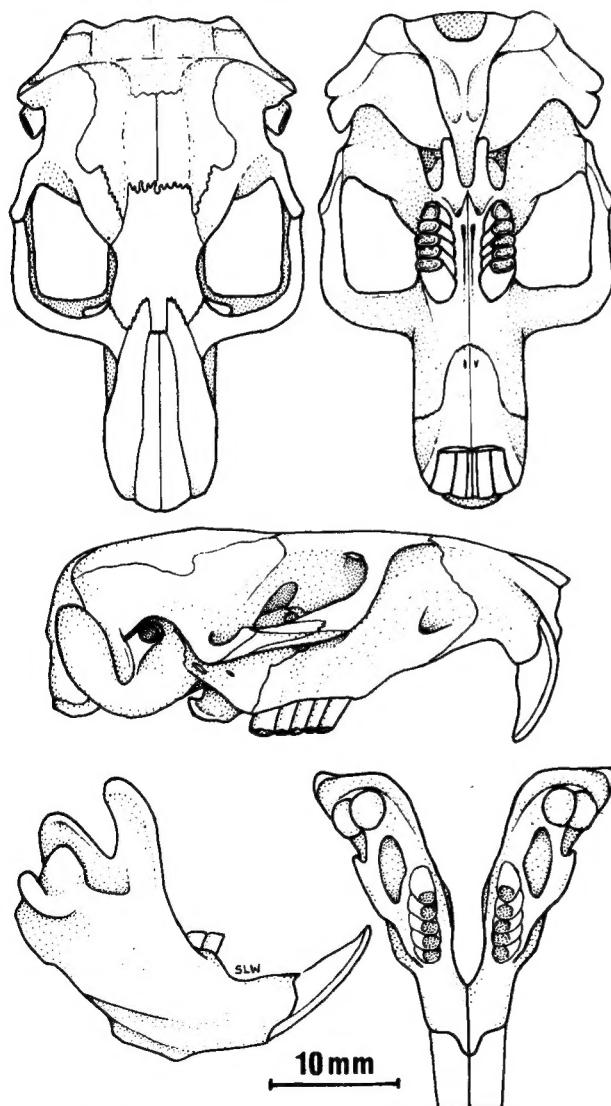


FIGURE 1. Dorsal, ventral, and lateral views of cranium, and lateral and occlusal views of lower jaw of *Geomys arenarius*, TTU 11787, female from Rio Grande River W Las Cruces, Dona Ana Co., New Mexico.



FIGURE 2. Adult female *Geomys arenarius*.



FIGURE 3. Ventral view of *G. arenarius*, showing the external fur-lined cheek pouches and bisulcate incisors.

length, 253 (244 to 261), 233 (221 to 247); tail length, 79 (74 to 84), 69 (58 to 80); hind foot length, 30.9 (30.0 to 32.0), 29.3 (27.0 to 32.0); basilar length, 35.9 (34.2 to 36.8), 32.4 (30.3 to 35.0); rostrum length, 17.9 (16.8 to 19.0), 15.8 (14.9 to 17.5); rostrum breadth, 9.5 (9.2 to 10.0), 9.0 (8.6 to 9.6); nasal length, 15.0 (13.6 to 16.1), 13.0 (11.8 to 14.6); zygomatic breadth, 25.4 (23.6 to 27.1), 23.3 (21.8 to 25.0); mastoid breadth, 23.9 (23.0 to 24.9), 22.2 (20.8 to 23.9); interorbital breadth, 6.2 (5.8 to 6.2), 6.2 (6.0 to 6.5); upper molar alveolar length, 7.8 (7.4 to 8.0), 7.4 (6.8 to 7.9). Average Ives tint photometer reading for red of *G. a. brevirostris* is 18.5 per cent (Blair, 1943).

Davis (1960) reported body weights of *G. arenarius* ranging from 198 to 254 g in males and from 165 to 207 g in females.

DISTRIBUTION. *G. a. arenarius* usually inhabits the narrow strip of bottom land along the upper Rio Grande Valley from Porvenir, Chihuahua, north to Las Cruces, New Mexico, and westward to Deming, New Mexico (figure 4). Specific published localities are as follows (Anderson, 1972; Bailey, 1932; Blair, 1943; Davis *et al.*, 1971; Davis, 1940; Jones and Lee, 1962; Price and Emerson, 1971): *El Paso County, Texas*—El Paso, 2 mi. E El Paso, 15 mi. above El Paso on Rio Grande River, 8 mi. E and 5 mi. S El Paso City Hall, 10 mi. SE El Paso City Hall; *Hudspeth County, Texas*—no specific locality; *Chihuahua*—Juarez, 7 mi. SE Cd. Juarez, 8 mi. S Samalayuca, 1.5 mi. NE Porvenir; *Porvenir*; *Dona Ana County, New Mexico*—Las Cruces, 2 mi. N Las Cruces, Rio Grande River W Las Cruces, 3–4 mi. E Las Cruces, Mesilla Park, Kenzin; *Luna County, New Mexico*—Deming. *G. a. brevirostris* occurs only in the Tularosa Basin of New Mexico (figure 4) in the vicinity of White Sands National Monument and White Sands Missile Range. Specific localities of known occurrence, all in Otero County, New Mexico, are as follows: 10 mi. SW Tularosa, 9 mi. W Tularosa, 12 mi. W Alamogordo (Hall, 1932). Field studies by personnel of Texas Tech University suggest that *G. a. brevirostris* probably no longer occupies some of the areas where specimens originally were collected. It appears that *Pappogeomys castanops* may be replacing this subspecies, as it has some other pocket gopher populations (Reichman and Baker, 1972). It was once thought that *G. arenarius* occurred at Monahans, Texas (Bailey, 1932), but pocket gophers in this vicinity were later identified as *G. bursarius* (Davis, 1940; Villa-R. and Hall, 1947). The close geographic occurrence of these two species suggests that *G. bursarius* is ancestral to *G. arenarius* (Davis, 1940; Russell, 1968), but, if *G. personatus* is more closely related to *G. arenarius*, as suggested by Alvarez (1963), then the latter probably reached its present geographic distribution by moving along fluvial deposits of the Rio Grande River during favorable times in the past. This hypothesis is supported by the distribution of various subspecies of *G. personatus* (Davis, 1940) and the present position of *G. arenarius* in the Rio Grande Valley.

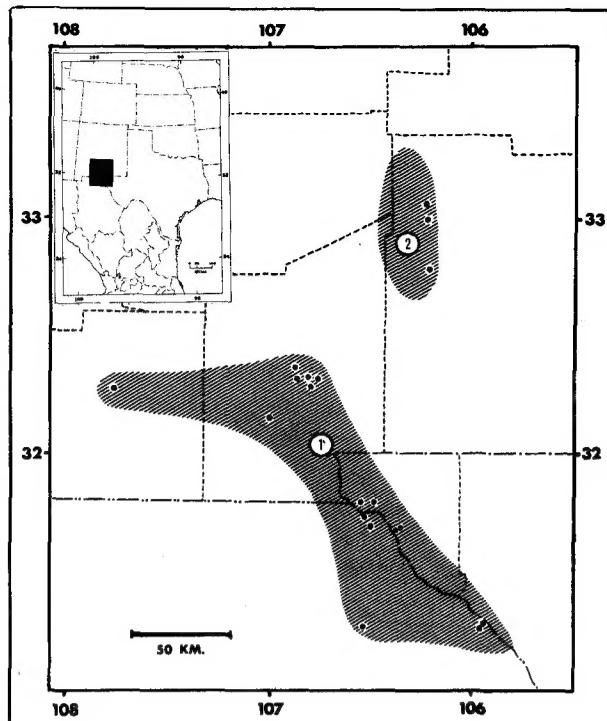


FIGURE 4. Geographic distribution of *Geomys arenarius* and its subspecies: 1, *G. a. arenarius*; 2, *G. a. brevirostris*. Dots represent recorded localities from Texas, New Mexico, and Chihuahua.

FOSSIL RECORD. Russell (1968) suggested that *G. arenarius* differentiated from *G. bursarius* in the post-Wisconsin glacial age. In light of Alvarez's (1963) proposed relationships, this postulated divergence needs further investigation.

FORM. Measurements given by Merriam (1895) and Hall (1932) show sexual dimorphism in both subspecies. Excluding interorbital breadth, means of all external and cranial measurements were greater among males. The mean interorbital breadth was the same for both sexes in each subspecies, but was slightly smaller in *G. a. brevirostris*. *G. a. brevirostris* is further differentiated from *G. a. arenarius* by shorter nasals and rostrum, parallel or anterior convergence of temporal ridges, greater inflation of tympanic bullae, squamosal extending farther laterally toward the external auditory meatus, greater ratio of interparietal breadth and length, zygomatic arch more rounded anteriorly, jugal extending more into maxilla, and wider interpterygoid space (Hall, 1932).

Externally, *G. a. brevirostris* has darker pelage than does *G. a. arenarius* (Hall, 1932). Benson (1933) found these gophers in moist sand and suggested that the color was adapted to the habitat—as is the case in other mammals in the White Sands region. However, the occurrence of individuals of similar color in moist and dry sand, and significant differences between photometer readings of the soil and pelage, contradicts this postulation. A possible alternative explanation is that *G. a. brevirostris* has recently migrated into the area and possesses a remnant character that will eventually evolve to a paler color phase (Blair, 1943). The only other color variant known is an albino *G. a. brevirostris* (Benson, 1933). No information is available on the postcranial skeleton or soft anatomy of this species.

FUNCTION. No physiological information has been published for this species.

ECOLOGY. *Geomys arenarius* prefers loose soil, which occurs in disturbed terrain or sandy areas along river banks, or in the Tularosa Basin. Individuals commonly are found along edges of open water such as rivers, ponds, or irrigation canals (Bailey, 1932; Benson, 1933; Merriam, 1895). This refined habitat selection is the primary isolating mechanism of this species. Surrounding territory is marked by deserts and rocky mesas (Bailey, 1895). The area of distribution is in the northern portion of the Chihuahuan Biotic Province, which is

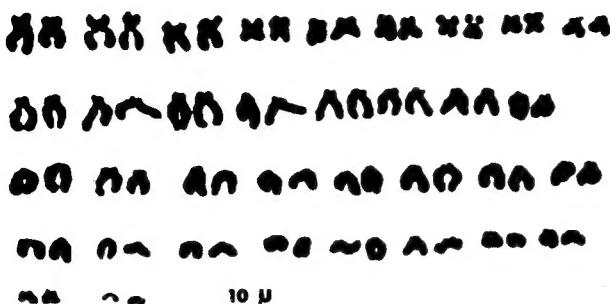


FIGURE 5. Representative karyotype of a male *Geomys arenarius arenarius*.

characterized by an arid climate with a moisture deficiency index of -40 to -60 % (Blair, 1950). Summers are long and hot, and winters are moderate (Dice, 1930). Many general faunal and floral assemblages associated with *G. arenarius* have been described (Bailey, 1905; Benson, 1933; Blair, 1941, 1943, 1950; Dice, 1930; Merriam, 1895). Blair (1941) reported that *Perognathus apache* and *Dipodomys ordii* often occupy old burrow systems of *G. arenarius*. Price and Emerson (1971) described a species of parasitic louse, *Geomydoecus quadridentatus*, which was found only on the two subspecies of *G. arenarius*.

REPRODUCTION AND ONTOGENY. Jones and Lee (1962) suggested that *G. arenarius* has a prolonged breeding season during the summer months, which may allow more than one litter per year. The number of embryos ranges from four to six. The maximum recorded crown-rump length is 30 mm.

GENETICS. *G. arenarius* has a diploid number of 70 chromosomes and a fundamental number of 102, with approximately 18 pairs of biarmed elements (figure 5). This karyotype characterized six males and nine females from the banks of the Rio Grande River west of Las Cruces, New Mexico. No chromosomal variation was found (Davis *et al.*, 1971). Inasmuch as *G. bursarius* or *G. personatus* is probably ancestral to *G. arenarius* and both have a diploid number near 70 with a karyotype composed primarily of acrocentric elements (Davis *et al.*, 1971; Matthey, 1960), Davis *et al.* (1971) assumed that *G. arenarius* obtained its high fundamental number through a series of pericentric inversions or translocations.

REMARKS. Although the specific status of *G. arenarius* has been questioned, no serious argument has been presented in the literature against specific recognition. The facts that this species is allopatric with other members of the genus and has distinguishable morphological and karyotypic characters support its uniqueness as a species.

The current status of *G. a. brevirostris* is uncertain. It is possible that this subspecies has been completely replaced by *Pappogeomys castanops*. The current geographic distribution of this subspecies needs further investigation, but because the assumed distribution of *G. a. brevirostris* is within the boundaries of White Sands National Monument and White Sands Missile Range, efforts to collect specimens are restricted.

The generic name *Geomys* is derived from the Greek word roots *Geo* and *mys*, meaning "earth" and "mouse" (respectively). The specific name, *arenarius*, originates from the Latin

word roots *aren*, meaning "sand," and *arios*, meaning "connected with." The subspecific name, *brevirostris*, is from the Latin word roots *brevi* and *rostros*, meaning "short rostrum."

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Principal editor of this account was S. ANDERSON.

S. L. WILLIAMS AND R. J. BAKER, DEPARTMENT OF BIOLOGY AND THE MUSEUM, TEXAS TECH UNIVERSITY, LUBBOCK, 79409.